

## **REMARKS**

Claims 1 and 10 have been amended. No new matter has been added. Thus, claims 1-33 and 36-42 are pending.

### **Rejection under 35 U.S.C. § 112**

#### **Written Description**

Claims 1-33 and 36-42 were rejected under 35 U.S.C. § 112, 1<sup>st</sup> paragraph, as lacking sufficient written description. The Office Action asserts that the phrase "... in the absence of an applied electric potential ..." is new matter and is not supported explicitly or implicitly by the specification. The Office Action further asserts that the phrase "... remains in a quantum confined state ..." is not supported sufficiently in the specification.

The rejection of the claims as lacking sufficient written description with respect to the phrase "... in the absence of an applied electric potential ..." is respectfully traversed. Applicants respectfully disagree with the Examiner's characterization of the substance of the interview held via telephone on July 8, 2003 and made of record in the Interview Summary attached to the present Office Action. During this interview, Applicants' representative referred to the disclosure relating to chemical doping at page 6, lines 17-29 of the specification. As was noted in the interview, this disclosure is distinct from any disclosure of either electrochemical doping or doping by light induced electron transfer. This portion of the interview did not focus on light induced electron transfer, but rather on chemical doping with an oxidizing or reducing agent, which clearly does not require any applied electrical potential or electromagnetic radiation. Thus, the Examiner's statement in the Interview Summary regarding light induced electron transfer and its alleged generation of an applied electrical potential is unrelated to the issue of whether the chemical doping disclosure provides support for this claim language. As noted in the previous Amendment and Request for Reconsideration, filed May 2, 2003, the standard definitions of oxidizing and reducing agents in the disclosed chemical doping process are not to be confused with "anything that results in oxidation

or reduction" [Paper No. 13, pp. 8-9]. Only when the standard definitions are ignored is there any uncertainty regarding the absence of an applied electric potential in the chemical doping process.

It is noted for the record that other forms of doping disclosed in the specification other than chemical doping can also provide quantum confined carriers in the absence of an applied electrical potential. For example, electrochemical doping involves the application of an electrical potential to a semiconductor nanocrystal in the presence of an electrolyte. However, the doped state of the semiconductor nanocrystals can be detected after the doping process is stopped and the electrical potential has been removed (p.6, line 30 – p.7, line 10).

Applicants also respectfully disagree with the assertion in the Office Action that the phrase "... in the absence of an applied electric potential ..." constitutes new matter and with the assertion in the Interview Summary that "... any negative limitation must have explicit support as required by the MPEP." The actual guideline in the MPEP states that:

Any negative limitation or exclusionary proviso must have  
basis in the original disclosure. [MPEP 2173.05(i)]

The requirement for a "basis" is not to be equated with "explicit support" as alleged by the Examiner. Rather, this section of the MPEP references MPEP §2163 - §2163.07(b), which states that:

While there is no *in haec verba* requirement, newly added  
claim limitations must be supported in the specification  
through explicit, implicit, or inherent disclosure.  
[MPEP 2163, subsection I.B.]

Thus, the support for the phrase "... in the absence of an applied electric potential ..." can be explicit, implicit or inherent, and there is no requirement for implicit or inherent support to be converted into explicit support by amendment to the specification.

The discussion above and in the previous Amendment and Request for Reconsideration, filed May 2, 2003 has provided sufficient evidence that the

specification as filed inherently supports this claim recitation. Accordingly, the phrase "... in the absence of an applied electric potential ..." is neither new matter nor inadequately described in the application as filed, and Applicants request that this rejection be withdrawn.

Applicants also respectfully disagree with the Office Action's assertion that the specification fails to disclose that the carrier "... remains in a quantum confined state ...". In construing this portion of the claims, the Office Action has effectively defined the term "remains" as meaning either "remains indefinitely" (page 6, lines 6-8) or remains for "minutes or hours" (page 7, lines 4-5), even though the claims do not include a time limitation. Regardless, the rejection of the claims as lacking sufficient written description for this phrase has been obviated by appropriate amendment. As amended, independent claims 1 and 10 recite that "... the carrier is in a quantum confined state...". The present claims thus are not limited to carriers that remain in a quantum confined state indefinitely or to carriers that remain in a quantum confined state for minutes or hours. Rather, the present claims are defined only by the limitations recited therein and not by limitations that may be imported from the specification. The specification clearly shows that the carriers in Applicants' doped semiconductor nanocrystals are in quantum confined states, as has been noted in the previous Amendment and Request for Reconsideration, filed May 2, 2003. Accordingly, the present claims are fully supported by the specification with respect to the quantum confinement of the carriers, and Applicants request that this rejection be withdrawn.

### **Enablement**

Claims 1-33 and 36-42 were rejected under 35 U.S.C. § 112, 1<sup>st</sup> paragraph, as containing subject matter not described so as to enable one skilled in the art to make or use the invention. The Office Action asserts that the working examples in the specification disclosing doped nanocrystals of the semiconductor materials CdS, CdSe and ZnO are insufficient to enable one skilled in the art to produce doped nanocrystals of other semiconductor materials. Moreover, the Office Action asserts that even the

working examples are excluded from the claims and that the specification therefore fails to provide even a single method of making and using the claimed invention.

The rejection of the claims as not providing an enabling disclosure is respectfully traversed. As noted above, the present claims are not limited to doped semiconductor nanocrystals in which the carriers remain in a quantum confined state for minutes, hours or an indefinite length of time. The Interview Summary accurately describes the discussion on this topic, noting the Examiner's position during the interview that the specification provides an enabling disclosure for the claims as applied to CdS, CdSe and ZnO.

With respect to the applicability of the disclosed doping methods for semiconductors besides CdS, CdSe and ZnO, Applicants refer to the attached Declaration of inventor Philippe Guyot-Sionnest. In this Declaration, Prof. Guyot-Sionnest points out that he and other researchers have successfully applied the methods disclosed in the specification to other semiconductor materials. The expansion of these methods to other materials did not require undue experimentation. Rather, the doping of the new materials was carried out using methods that are substantially identical to the methods disclosed in the specification. Moreover, the materials that were doped using Applicants' methods represent completely different classes of semiconductor materials. The working examples in the specification belong to the class of II-VI semiconductors, whereas the other materials doped according to Applicants' methods include III-V semiconductors and IV-VI semiconductors.

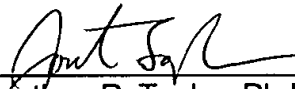
The specification provides explicit support for the claims as applied to the working examples of CdS, CdSe and ZnO. In addition, one skilled in the art would not be required to perform undue experimentation to apply the teachings of the specification, either to other II-VI semiconductor materials or to other classes of semiconductors. Accordingly, the present claims are fully enabled by the specification, and Applicants request that this rejection be withdrawn.

### Conclusion

In conclusion, all of the grounds raised in the outstanding Office Action for rejecting the application are believed to be overcome or rendered moot based on the remarks above. Thus, it is respectfully submitted that all of the presently presented claims are in form for allowance. Should the Examiner feel a discussion would expedite the prosecution of this application, the Examiner is kindly invited to contact the undersigned.

Respectfully submitted,

1/22/04

  
Jonathan P. Taylor, Ph.D.  
Registration No. 48,338  
Agent for Applicant

BRINKS HOFER GILSON & LIONE  
P.O. BOX 10395  
CHICAGO, ILLINOIS 60610  
(312) 321-4200